



FORBLUE sunsep™

Membranes for Gas Drying and Humidification

AGC

Your Dreams, Our Challenge

- Introduction
- Applications
 - Pneumatics
 - Gas Analysis
 - Humidification
 - Others





Introduction

Your Dreams, Our Challenge

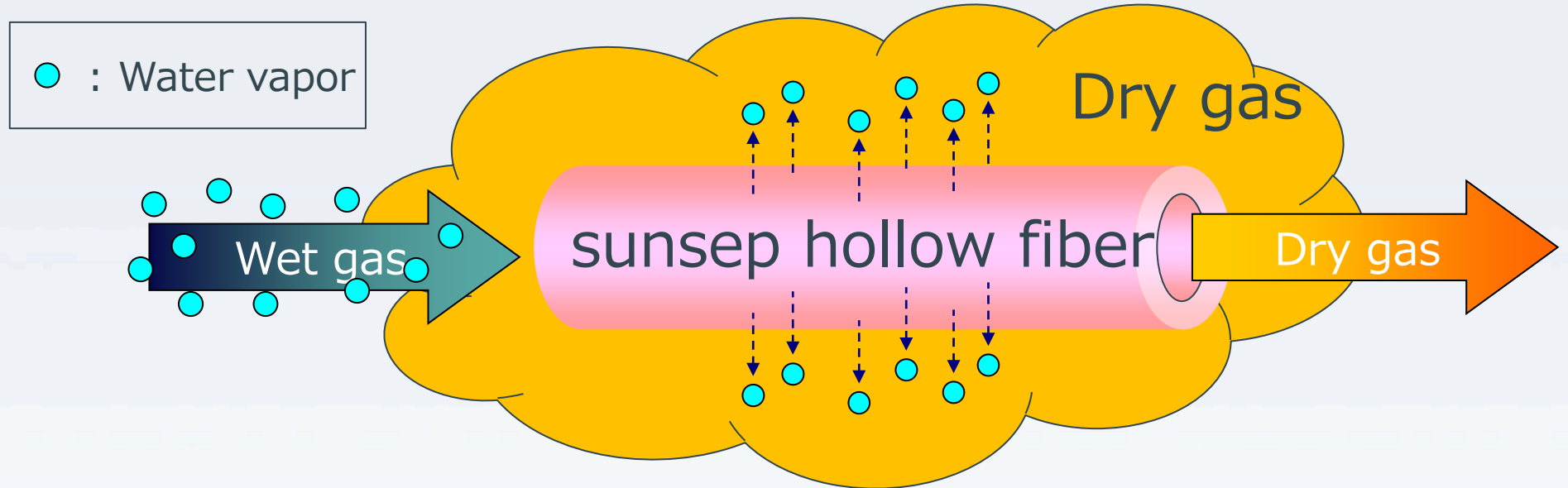
FORBLUE sunsep Hollow Fiber Membranes

- FORBLUE sunsep modules differ in shape
- All modules incorporate the same hollow fibers

What is FORBLUE sunsep?

- A “membrane gas dryer” that uses a perfluorocarbon ion-exchange resin
- Can be used to dry or humidify both air and gas
- Developed by AGC and launched in 1990

The principle of FORBLUE sunsep



The sunsep membrane transports water vapor from the inside to the outside of the hollow fiber depending on the “water vapor pressure differential”.

Product Lineup





Applications

Your Dreams, Our Challenge

Major Applications

Dehumidification

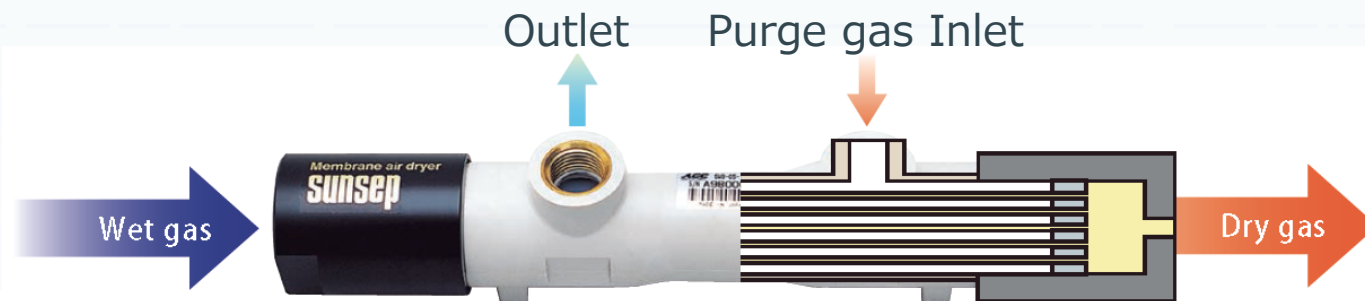
- Industrial compressed air : pneumatics
- Gas analysis: environmental, medical

Humidification

- Industrial gas treatment
- Medical oxygen gas
- Fuel cell

Purge Gas (Dehumidify Source)

- Purge gas = source of the water vapor pressure differential between inside and the outside of membrane.
- 2 methods of supplying the purge gas:
 - 1. Internal: Using a small portion of the dry gas that is produced
 - 2. External: Providing dry gas from an external source
- The standard purge gas flow rate is 20% of supply gas flow rate.
- The purge gas flow direction should be counterflow.

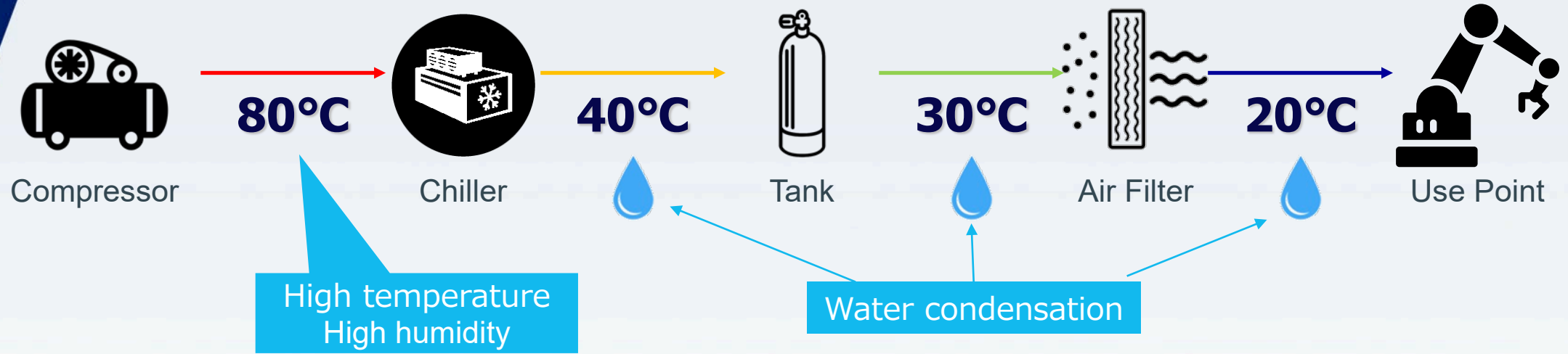


SWB/C/F Series for Pneumatics Applications



sunsep SWB/C/F series

The Importance of Dehumidifying Pneumatic Lines



- Pressurized air contains a lot of water vapor.
- Water condensation can damage pneumatic equipment.
- To protect the equipment, water vapor has to be removed before it condenses.

Methods of Compressed Air Dehumidification

- Cooling and condensing
 - Cooler (refrigeration/adiabatic compression)
- Absorption
 - Silica gel
 - Zeolite
- Membrane separation
 - Porous membrane (Molecular sieve)
 - Non porous membrane (sunsep)

Industrial Air Dryer Comparison

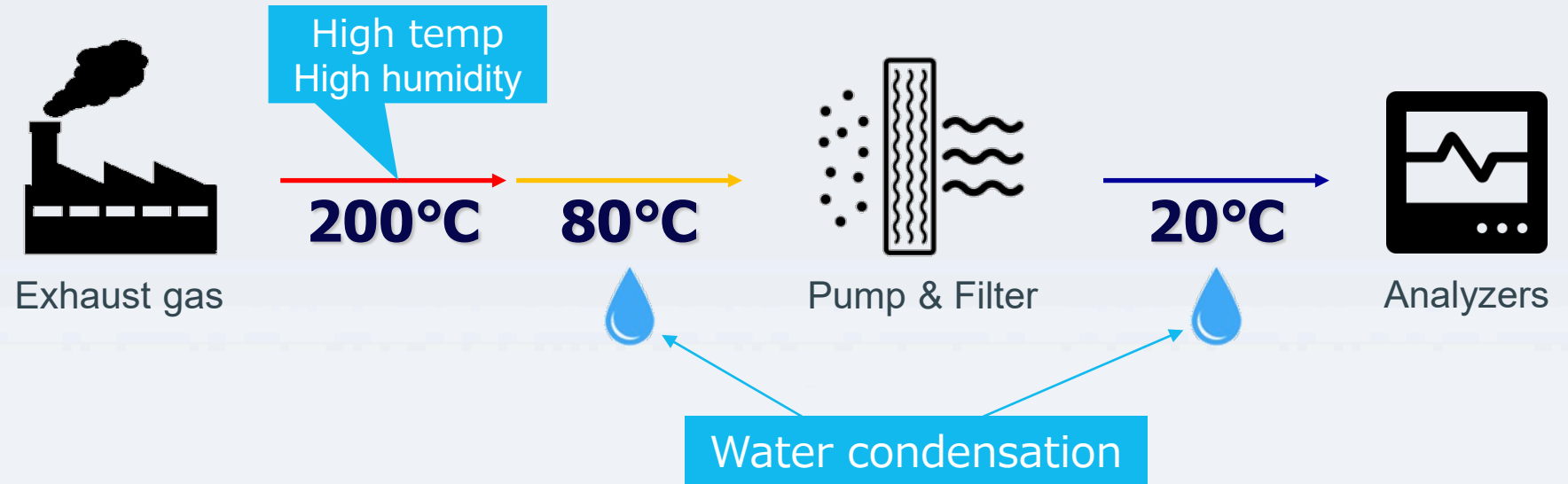
| Type | Air Cooler (Refrigeration) | Absorption | Membrane (Porous) | Membrane (Non porous) |
|-------------------------|-------------------------------|------------|----------------------|--------------------------|
| Unit Size | Large | Medium | Small | Very Small |
| Applicable Flow rate | Large | Medium | Small | Small |
| Dew point | -17 °C | -50 °C | -50 °C | -40 °C |
| Running cost | High | Medium | Low | Low |
| Maintenance | Yes | Yes | No | No |

SWG Series for Gas Analysis Applications



sunsep SWG series

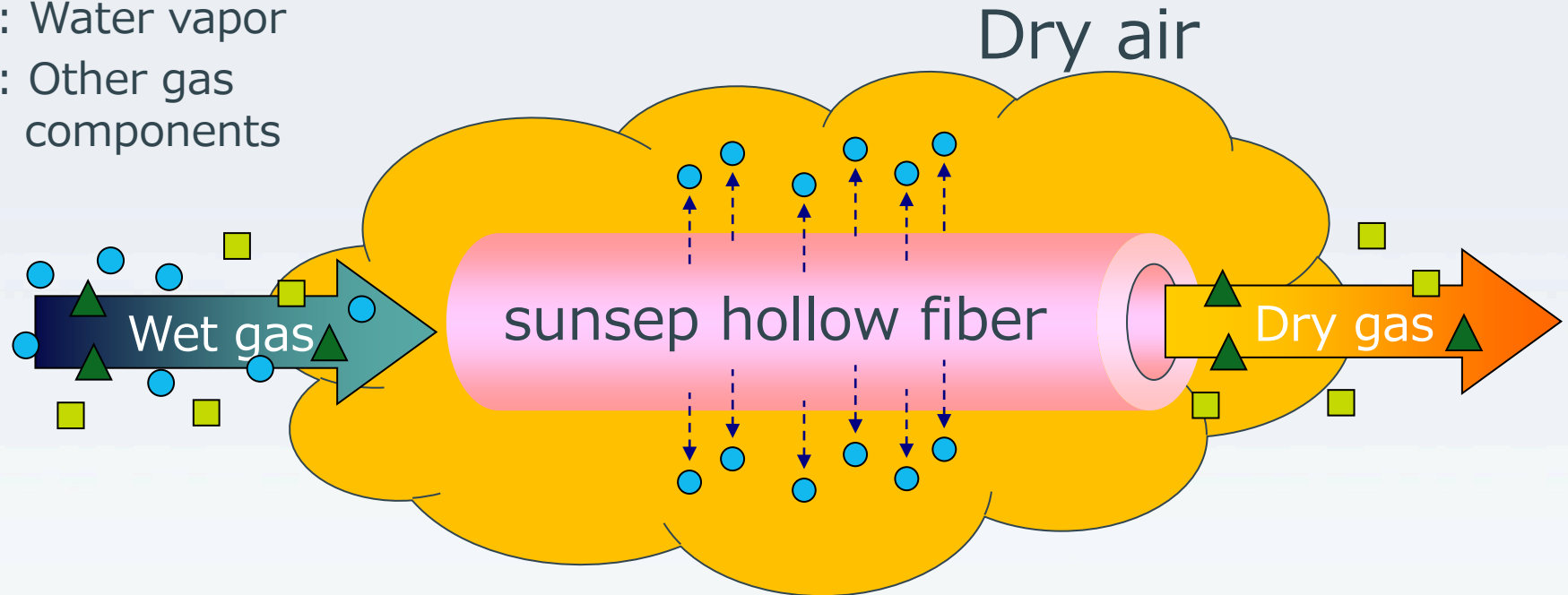
The Importance of Dehumidifying Sample Gas



- Sample gas contains a lot of water vapor.
- Condensed water causes trouble such as corrosion or a decrease in analytical precision.
- So the water vapor has to be removed from the sample gas.

High Water Vapor Flux

- : Water vapor
- : Other gas components
- ▲



The sunsep hollow fiber membrane is selectively permeable to water vapor only.



Dehumidification

Advantages:

- High water vapor removal
- Chemical resistance
- Little effect on the original gas composition

Applications:

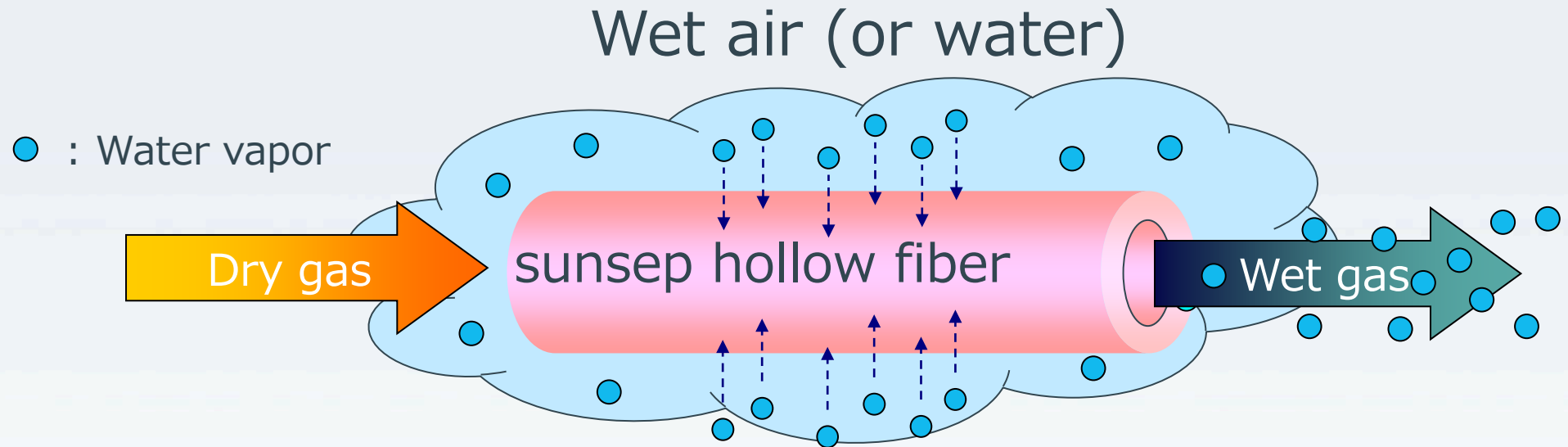
- Environmental monitoring
- Exhaust gas monitoring
- Expiration gas analysis

Humidification Applications



FORBLUE sunsep humidification modules are equipped with rust-proof materials.

Mechanism of Humidification



The sunsep membrane transports water vapor from the outside to inside.

Humidification

Advantages:

- Easy and fast to make the gas saturated
- Enables gas humidification without direct contact with water
- Low contamination risk from humidification source

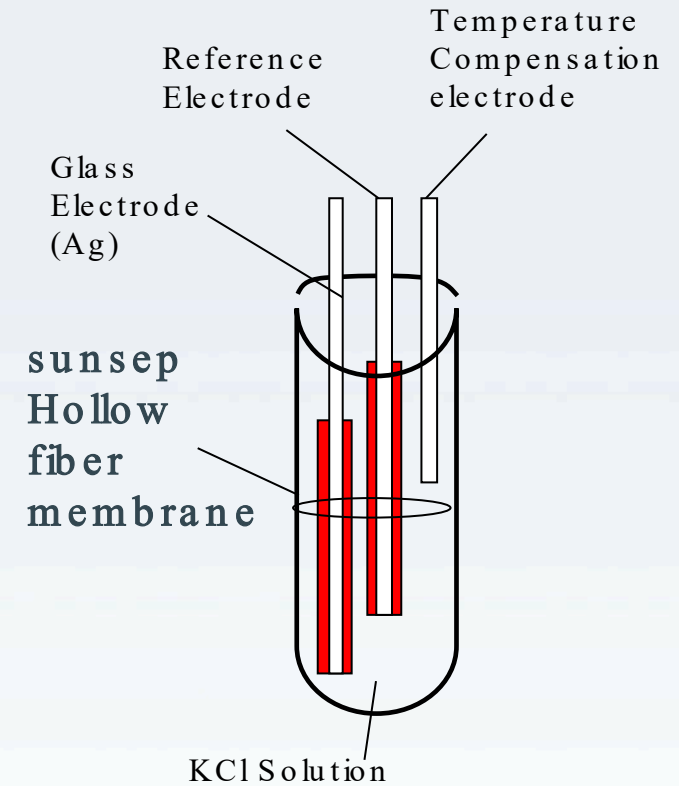
Applications:

- Medical oxygen humidification for home oxygen therapy
- Industrial gas humidification
- Humidification for fuel cells

Other Applications



Ammonia scrubber



pH electrode cover

So Why Use sunsep?

- Non-porous, for water-selective permeability
- Available in a wide variety of sizes
- Can be used for drying and humidification
- Easily connectable modules
- Ecological – no energy input required
- Durable, flexible, corrosion-resistant

A photograph of a white industrial machine, identified as a 'Membrane type dryer sunsep'. The machine has a black control panel on top with a dial. A label on the front of the machine reads 'Membrane type dryer sunsep'. The machine is positioned on a light-colored surface.

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